

1. Additional test A

Ink compositions of examples 14-17, comparative examples 10 and 11, and example 1 were prepared in the mixing proportions shown in Table 5 according to the first preferable form of the present invention.

A printed article was prepared using each of the ink compositions described in examples 14-17, comparative examples 10 and 11, and example 1 according to the first preferable form of the present invention, and those printed articles are evaluated for ozone resistance, nitrogen oxide resistance, and clogging resistance. In this test, three exposure times, i.e., six hours, 12 hours, and 24 hours, were provided for ozone resistance evaluation, and two non-use periods (for which the printer was left unused), i.e., two weeks and one month, are provided for clogging resistance evaluation.

The obtained evaluation results are shown in FIG. 6.

2. Additional test B

Ink compositions of example 18 and example 9 were prepared in the mixing proportions shown in Table 7 according to the second preferable form of the present invention.

A printed article is prepared using each of the ink compositions described in example 18 and example 9 according to the second preferable form of the present invention, and those printed articles were evaluated for ozone resistance, nitrogen oxide resistance, and clogging resistance. In this test, two non-use periods (for which the printer was left unused), that is, two weeks and one month, are provided for clogging resistance evaluation.

The obtained evaluation results are shown in FIG. 8.

The results of example 14 and comparative example 1, example 15 and comparative example 10, and example 18 and example 9 show that Na salt exhibits poor recoverability when the printer is left unused for longer periods, while Li salt maintains good recoverability even when the printer is left unused for longer periods. It is evident from the comparison with comparative example 11 that in comparative example 10, clogging resistance is lowered by the addition of an additive, and it can easily be judged from the results of example 15, comparative example 10, and comparative example 11 that Li salt is effective in improving ozone resistance while maintaining this good clogging resistance.

Table 5

		Examples				Comparative
		14	15	16	17	Ex1
Colorant	C.I. Direct Blue199 (*1)	1	3	0.5	0.5	1
Solvents et	Glycerol	10		3	3	10
	Triethylene glycol	10		15	15	10
	2-Pyrrolidone			0.5	0.5	
	Triethanolamine	1		0.5	0.5	1
	Diethylene glycol monobutyl ether					
	Triethylene glycol monobutyl ether	10		12	12	10
Olfine	E1010 (*2)	1	1	0.5	0.5	1
	Propylene glycol			8		
	1,2,6-hexanetriol			7		
Urea				6		
Additives	Disodium naphthalene-1,5-disulfonate					3
	Dilithium naphthalene-1,5-disulfonate					
10% water solution		30	20			
Figure in parentheses indicates solid content	(3)	(2)				
Dilithium benzene-1,3-disulfonate 10%				5	1	
water solution				(0.5)	(0.1)	
Figure in parentheses indicates solid content	0.3			0	0.3	0.3
Others	Froxel XI-2 (*3)				Remainde	
Water						
Ratio between colorant and aromatic sulfonic acid/s	1:3	3:2	1:1	1:0.2	1:3	

*1: Colorant having absorption wavelengths as shown in FIG. 1 used

*2: Made by Nissin Chemical Industry Co., Ltd.

*3: Made by Avecia Ltd.

Table 7

		Examples 18	Comparative Examples Ex9
Colorant	C.I. Direct Blue 86 (*4)	1	1
Solvents et	Glycerol	5	5
	Triethylene glycol	5	5
	Triethanolamine	1	1
	Triethylene glycol monobutyl ether	10	10
	Olfine PD001 (*5)	1	1
Additives	Disodium naphthalene-2,6-disulfonate	4	4
	Dilithium naphthalene-2,6-disulfonate	40	
	10% water solution		
	Figure in parentheses indicates solid co.	(4)	
Others	Proxel XL-2 (*6)	0.3	0.3
	Water	Remainder	
	Ratio between colorant and aromatic sulfonic acid/s	1:4	1:4

*4:Colorant having absorption wavelengths as shown in FIG. 2 used

*5:Made by Nissin Chemical Industry Co., Ltd.

*6:Made by Avecia Ltd.

